STATE OF CALIFORNIA-RESOURCES AGENCY

GEORGE DEUKMEJIAN, *Governor*

DEPARTMENT OF CONSERVATION
DIVISION OF OIL AND GAS
4800 STOCKDALE HWY., SUITE #417
BAKERSFIELD, CALIFORNIA 93309
(805) 322-4031

February 15, 1984

Mr. Les Fiedler
THOMAS OIL COMPANY
4311 Meadow View Place
Encino, CA 91436

Dear Mr. Fiedler:

After examining the data submitted in support of your request to inject produced waste water into the Olcese sand in the Dorsey Area of Mount Poso field, permission is denied because the zone does not qualify as an exempt aquifer under UIC Regulation 146.04 (b-1) for the following reasons:

1. The zone is not currently hydrocarbon producing in the Dorsey Area or is it expected to be commercially producible based on the evidence submitted.

2. The submitted information is from a well approximately 3-1/2 miles away from your lease in the Dorsey Area.

Yours truly,

A. G. HLUZA
Deputy Supervisor

AGH:mm

Thomas Oil Company • 4311 MEADOW VIEW PLACE • ENCINO, CALIF. 91436 • 213-981-5979 • 805-872-0613

February 8, 1984

Mr. Al Hluza
Division of Oil and Gas
Suite 417
Bakersfield, CA 93309

Dear Al:

Here is the information we spoke about yesterday.

In reviewing the language used by Mr. Lau with regard to SS 146.4 B1, I believe that he is placing great emphasis on the words "expectation of future commercial production".

It is my understanding that he fully expects the Olcese to be exempted on the basis of non-degredation by injected waters, and has suggested this alternative as a means of accelerating the decision and keeping it local.

Thanks again for looking at this situation.

L.C. Fiedler

LCF/bg
encl.

503-P 7-58

RECEIVED
FEB 19 1971
DIVISION OF OIL & GAS

029-11208

SHELL OIL COMPANY
DIVISION

SIDEWALL CORE RECORD

te 5-8-1970

Section 9 Twsp. 27S Rge. 28E SB B.&M. MDB&M.

pe Sidewall Sampler Schlumberger

Area or Field MT. POSO

res Examined By N. DOGAN

Well "Vedder" 12-15

DEPTH	REC	RUN	DESCRIPTION *	LITH SYMB	OIL SHOWS **									
							Sample Oil Fluor.			Cut		Summary	
					% Oil Stain	Hydro-carbon Odor	%	Inten.	Color	Color of Cut	Color of Cut Fluor.	Show No. Avg.	Show Symb
132			CLAYEY SILTSTONE: V. MICACEOUS, GRAY, V. FAINT HC odor.		%								
172			OSS: (DESATURATED). Gray, pred. medium grain, subangular, moderately-well sorted, clean, V. good P & P, Easily friable	S	3	1	3	1	1	1.5	2	1.8	
188			OSS: (DESATURATED), Gray, V F G. sub rounded V well sorted, clean. Good porosity, poor perm.	S	3	1	3	1	1	2	2	1.85	
200		OS	CLAYEY SILT: Gray, abundant mica faint HC odor. poor P & P		3	1	3	1	1	2.3	2	1.9	
206			OS. SILTY. V.F.G. SS = (DESATURATED), GRAY, clayey, poor P & P, faint HC odor micaceous.	2	3	1	3	1	1	1.75	2	1.8	
214			OS. SILTY SAND = A.A.	2	3	1	3	1	1	2.2	2	1.9	
227			OSS = (DESATURATED), V F G, Gray, Well sorted, sub rounded, good porosity, fair-poor permeability. clean.	3	3	1	3	1	1	2.2	2	1.9	

503-P 7-38

L

SHELL OIL COMPANY
DIVISION

SIDEWALL CORE RECORD

Date 5-8-1970

Type Sidewall Sampler Schlumberger

Cores Examined By N. DOGAN

Section 9 Twsp. 27S Rge. 28E SB&M. MDB&M.

Area or Field MT. POSO

Well Veddec 12-15

DEPTH	REC	RUN	DESCRIPTION *	LITH SYMB	OIL SHOWS **									
							Sample Oil Fluor.			Cut		Summary	
					% Oil Stain	Hydro-carbon Odor	%	Inten.	Color	Color of Cut	Color of Cut Fluor.	Show No. Avg.	Show Symb
231			OSS. Lower UFG.. same as 227, some silt	3	3	1	3	1	1	2.2	2	1.9	
245			SHALE = Gray, Micaceous.										
264			OSS = (DESATURATED), Gray, Med. Grain, well sorted, sub rounded to Sub angular, easily friable. very clean. V. good P&P	S	3	1	3	1	1	1.2	1	1.6	
271			OSS (DESATURATED) A.A (264)	S	3	1	3	1	1	1.3	1	1.7	
279			OSS (DESATURATED). pred. M.G. some Coarse G. disseminated throughout. Well sorted, Sub rounded, Easily friable. P&P V. good. clean easily friable	S	3	1	3	1	1	1.2	1	1.6	
285			OSS (DESATURATED), Gray, pred UFG, Well sorted, friable. fair-good P&P. some silt.	3	3	1	3	1	1	1.4	1	1.7	
300			OSS: Same AS # 285. Some fine Grains disseminated throughout.	3	3	1	3	1	1	1.2	1	1.6	

Symbol, % sand: C, 0-5%; 1, 5-30%; 2, 30-65%; 3, 65-85%; S, 85-100%.

** See Legend for Oil Shows (over)

M-1703-P 7-58

SHELL OIL COMPANY
DIVISION

SIDEWALL CORE RECORD

Date 5-8-1970

Type Sidewall Sampler Schlumberger

Cores Examined By N. DOGAN

Section 9 Twsp. 27S Rge. 28E SB&M. MDB&M.

Area or Field MT. Poso

Well Vedder 12-15

DEPTH	REC	RUN	DESCRIPTION *	LITH SYMB	OIL SHOWS **									
							Sample Oil Fluor.			Cut		Summary	
					% Oil Stain	Hydro-carbon Odor	%	Inten.	Color	Color of Cut	Color of Cut Fluor.	Show No. Avg.	Show Symb
308			OSS (DESAT.) Gray, L M – UF G. Clean, easily friable, well sorted, sub rounded P&P ■ V. Good.	S	3	1	3	1	1	1.5	1	1.65	
315			OSS (DESAT). Gray, VFG, well sorted, sub rounded, fair perm, good porosity some silt.	3	3	1	3	1	1	2	2	1.7	
331			OSS (DESAT). GRAY, pred M to Coarse Grain. fine grains disseminated throughout, clean, poor – fair sorting, sub rounded to sub angular. good P&P	S	3	1	3	1	1	2	2	1.7	
336			OSS (DESAT) Pred LVFG, silty, conglomeratic, fair-poor P&P. clayey,	3-2	2	1	3	1	1	2.5	2	1.65	
343			OSS (DESAT). Gray, Med to Fine grained, moderate sorting, clean, easily friable, good P&P	S	3	1	3	1	1	2	1.5	1.8	
354			OS silt. LVFG sandy, Gray, micaceous, poor P&P	1	3	1	3	2	1	3	3	2.3	

Symbol, % sand: C, 0-5%; 1, 5-30%; 2, 30-65%; 3, 65-85%; S, 85-100%.

**See Legend for Oil Shows (over)

New Document

VEDDER 12-15

COMPANY SHELL OIL CO.

SCHLUMBERGER INDUCTION ELECTRICAL LOG

COMPANY SHELL OIL COMPANY

WELL "VEDDER 12-15"

FIELD MT. POSO

COUNTY KERN STATE CALIFORNIA

LOCATION 1605'W & 573'N FROM THE S.E. CORNER OF:

Other Services: ST, SNP, FDC-GR

Sec. 9 Twp. 27S Rge. 28E

RECEIVED ... 1971 ... & GAS

t Datum: GL, Elev. 1125

red From DF, 4 Ft. Above Perm. Datum

easured From DF

Elev.: K.B. ___ D.F. 1129 G.L. 1125

	5-7-70			
	ONE			
iller	375			
gger	377			
terval	376			
terval	80			
riller	-	@		
ogger	-			
	9-7/8	@	@	@
n Hole	FGM			
isc.	70			
d Loss	- 40 ml	ml	ml	ml
ample	CIRC.			
. Temp.	6.28 @ 80 °F	@ °F	@ °F	@ °F
. Temp.	5.19 @ 62 °F	@ °F	@ °F	@ °F
Temp.	- @ - °F	@ °F	@ °F	@ °F
R_{mc}	M -			
	5.5 @ 92 °F	@ °F	@ °F	@ °F
irc.	1 HR.			
mp.	92 °F	°F	°F	°F
tion	3706 BK			
	MERTH			

OLD HERE — The well name, location and borehole reference data were furnished by the customer.

EMARKS

hanges in Mud Type or Additional Samples		
ate / Sample No.		
epth—Driller		
ype Fluid in Hole		
Dens. / Visc.		
ph / Fluid Loss	ml	
Source of Sample		
R_m @ Meas. Temp.	@ °F	@ °F
R_{mf} @ Meas. Temp.	@ °F	@ °F
R_{mc} @ Meas. Temp.	@ °F	@ °F
Source: R_{mf} / R_{mc}		
R_m @ BHT	@ °F	@ °F
R_{mf} @ BHT	@ °F	@ °F
R_{mc} @ BHT	@ °F	@ °F

Scale Changes

Type Log	Depth	Scale Up Hole	Scale Down Hole

Equipment Data

Run No.	Tool Type	Tool Position	Other
ONE	6FF40	STAND-OFF	

Run No.	ONE
C.D.	USED
S.O.	1.5"
Equip. PANEL No.	M
Used: CART. No.	F-259
SONDE No.	M-181
IAP No.	D-
S.B.R.	1

Check one, filling in blanks where applicable:

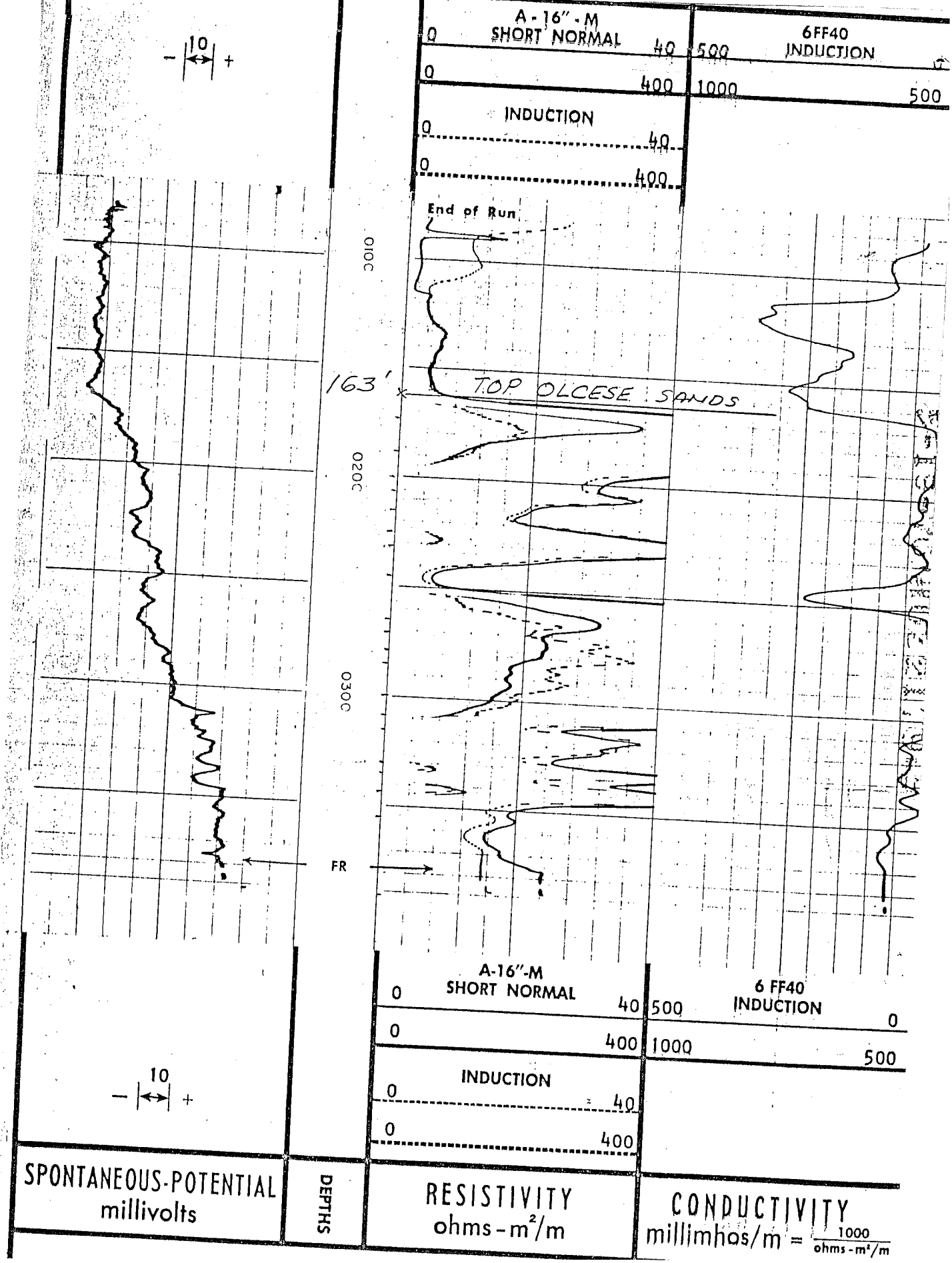
[X] Surface determined sonde errors used for 6FF40.

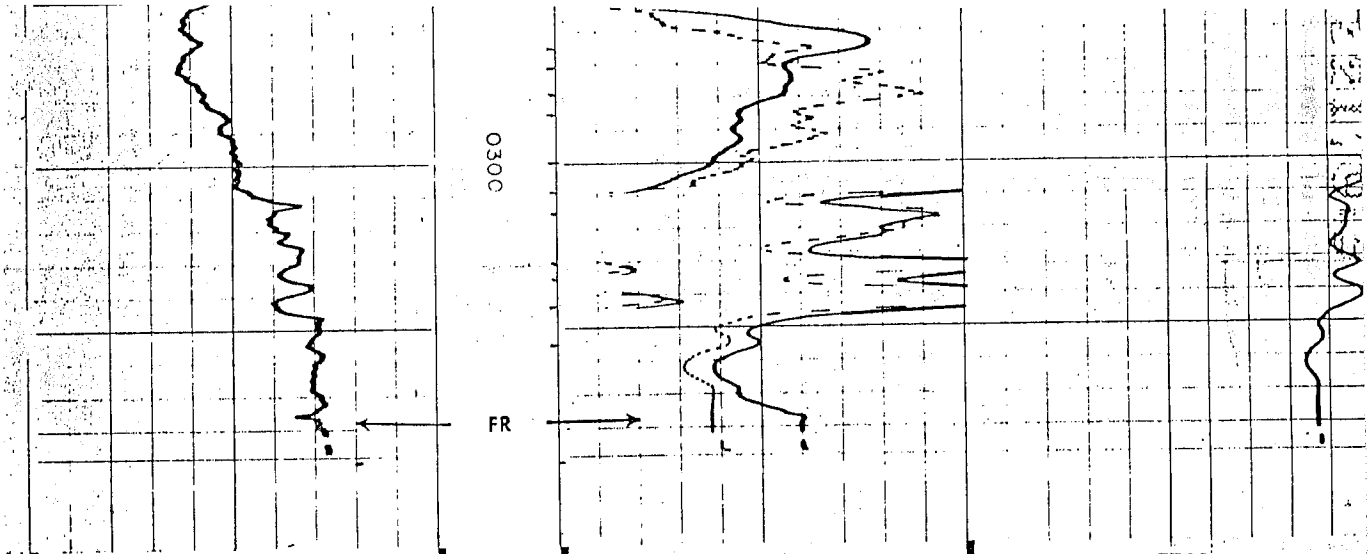
[ ] 6FF40 sonde error corrected for borehole signal at Rm = ___ inch

[ ] 6FF40 zero set in hole at depth of ___ feet.

SPONTANEOUS POTENTIAL millivolts	DEPTH	RESISTIVITY	CONDUCTIVITY

ED_001000_00021339-00007





SPONTANEOUS-POTENTIAL millivolts	DEPTHS	RESISTIVITY ohms-m^2/m	CONDUCTIVITY millimhos/m = $\frac{1000}{\text{ohms-}m^2/m}$
10 — ↔ +		A-16"-M SHORT NORMAL 0 — 40	6 FF40 INDUCTION 500 — 0
		0 — 400	1000 — 500
		INDUCTION 0 — 40	
		0 — 400	

COMPANY SHELL OIL COMPANY

WELL VEDDER 12-15

FIELD MT. POSO

COUNTY KERN STATE CALIFORNIA

SCHL. FR 376
SCHL. TD 377
DRLR TD 375
Elev:
KB
DF 1129
GL 1125

New Document

Subj: Application for exemption of Olcese zone in the Dorsey area of Mount Poso field

The application, from Thomas Oil Company, for Olcese zone exemption is based upon three points:

1) The existence of no wells producing from the Olcese zone in the vicinity of the Dorsey area.
2) Produced water from the Dorsey area is better than the Olcese formation water.
3) The Olcese zone has the potential to be hydrocarbon producing.

In response to these points, the following comments are made:

1) Olcese zone water is good enough to have legitimate usable potential. If we are going to attempt to follow the spirit of the UIC, this is clearly a case of water worthy of protection.
2) The Olcese zone water analysis furnished is from the "Tribe A" lease, located in the Main area of Mount Poso field. There is really no relationship. Since the Vedder zone water on the "Tribe A" lease tests worse than the Olcese zone at that location, I would assume that the same relationship holds in the Dorsey area, i.e. the Olcese zone water being of better quality than the produced water.

3) There is no evidence, whatsoever, at this time, that the Olcese zone has the potential for commercial hydrocarbon production. The existence of logs & cores indicating oil saturations belies the point that no legitimate attempt at commercial production has been made.

Two additional comments should be made:

1) Even if the Olcese zone were exempted, this would still clearly be a case of injection in formation water of a better quality than our base of fresh water criteria ($R_w > 3.3$) or the UIC "absolutely no degradation" criteria (TDS < 3000 ppm). Therefore, in conformance with our past practice, we would not allow injection if a Olcese sample from the injection well tested better than the produced water, in spite of the UIC exemption.

2. Until very recently, surface disposal of Thomas Oil Co. waste water was allowed by the RWQCB. This may temper our decision somewhat. Also, Thomas may want to pursue the possibility of receiving approval to discharge to the surface again.

THB

Thomas Oil Company • 4311 MEADOW VIEW PLACE • ENCINO, CALIF. 91436 • 213-981-5979 • 805-872-0613

Application for exemption of Olcese Fm in Mt. Poso
ltr 10/17/83

RECEIVED
OCT 6 1983

note: Injection H_2O & Fm. H_2O Analyses are from different areas.

October 4, 1983

Mr. Dave Mitchell
Department of Conservation
Sivision of Oil and Gas
4800 Stockdale Hwy
Suite 417
Bakersfield, CA 93309

Re: applicaiton for exemption of Olcese zone in Sec 26 T27S R28E MDBM Gardner Lease

Dear Mr. Mitchell:

I have reviewed the Environment Protection Agency "Criteria to exempt Aquifers" and have investigated the available data relative to the above captioned disposal site.

The Olcese zone does not porduce water which serves as a drinking water source within a five mile radius of the above captioned lease. A detailed search of the records of the Kern Water Agency reveals no records of domestic water wells completed in the Olcese within the entire township. A search of the local area by land revealed a total of 4 domestic water wells within a five mile radius of the site. All 4 of the wells located were completed along stream beds at shallow depths and presumed to produce water from the stream course rather than the Olcese.

wrong

Typical Analysis of the water to be injected is:

B.C. Labs, lab No.	5982	5983	5984	5985
Well No.	Dorsey Inj. well	Dorsey #2	Dorsey #4	Dorsey #4
Boron	1.2 PPM	0.82 PPM	0.90 PPM	1.1 PPM
Chloride	254 PPM	148 PPM	98.2 PPM	223 PPM
Electrical Conductivity Micromohis X 106	1590	1340	1530	1330

Typical analysis of the water known to be produced from the Olcese: in Sec 28 of T29S R28E MDB&M, approximately 1.5 miles due west of the injection site is represented by the last three boiling test run on the well, tribe A6, in February 1975.

B.C. Labs, Lab No.	1172	1173	1209
Boron	2.51	2.49	3.52
Chloride	216.3	250.3	266.62
E.C. in Micromohis X 10-6	1750	1830	1900

(see enclosures)

It can readily be seen that the water produced by the Dorsey and Gardner Leases is of better quality than the water found in the Olcese Formation. It is obvious that continued disposal of the Dorsey and Gardner water into the Olcese Formation should improve rather than degrade the quality of the water in that formation. There is no record of analysis being run on residual oils and greases in the Olcese Formation water. A study of drillers logs relating to wells complete in Sec. 26 show references to "carbonaceous material", found in the Olcese Formation, although such references are not conclusive proof hydrocarbons being present, they may well be indicative of the presence of such hydrocarbons. Work is currently being done by Frank Mondary which has revealed several verifable oil shows in the Olcese zone in the Mount Poso field. That work will be in your possesion within two to three weeks, and the results of that work will be submitted as a supplement to this application.

The Dorsey area is more than ten miles from the nearest town, situated in rolling hills which are currently used for cattle grazing. The produced waters are currently used for cattle watering prior to disposal by injection into surface outcrops of the Olcese. The disposal into the Olcese was begun in the fall of 1978 and has continued to present at the rate of approximately 4000 barrels per day. Percolation of waste water into the Olcese outcrops in the stream bed has occured. Produced water from "Dorsey Area" production has been percolating into Olcese outcrops in the stream bed since 1928.

The data presented indicates that the Olcese Formation water is of lower quality than the produced water, and that the Olcese zone has been receiving produced waters since 1928 which would produce substantial hydrocarbon contamination of the Olcese zone even if the zone did not contain hydrocarbons.

Mr. Dave Mitchell
October 4, 1983

We therefore apply for exemption of the Olcese Zone in the area known as the "Dorsey Area" for the disposal of waste water porduced in that area as represented by the enclosed analysis.

If you have any questions, please call.

Sincerely,

L.C. Fiedler

LC F/bg
encl

The gravity of oil was ... degrees Baumé ... per cent.

Names of Drillers: W. J. Matter, E. E. Arnold, P. R. Bassett,

Names of Tool Dressers: Art Vineyard, R. C. Penner, J. M. Gr[illegible]

Date drilling started January 30, 1930

Date well was completed February 21, 1930

Formations Penetrated by Well

Depth to top of Formation	Depth to bottom of Formation	Thickness	Name of Formation
0	48	48	Clay
			Cemented 16" S.P. casing at 48' with 8 sacks of cement
48	328	280	Clay and sand
	418	90	Sand with streaks of hard sand
	463	45	Sandy shale with streaks of hard sand
			CORED
463	483	20	Recovered 18'
463	473	10	Light gray, yellow streaks, silty slightly shaley sand - badly broken - fracture planes are slickensided - undoubtedly the formation is broken by faulting
	483	10	Yellowish gray fine grained slightly shaley sand - soft
			Note: Circulation was lost at 400' and was regained at 483' using Aquagel and hydroseal.
483	496	13	Recovered 6'
483	486	3	Yellowish gray very sandy shale - fine grained - rather broken - no fracture planes - some gypsum in spots
	489	3	Not hard fine grained silty gray shaley sand
	496	7	Probably shaley sand (?)
496	508	12	Recovered 3'
496	499	3	Fine grained shaley gray sand - some yellow spots - the top 10" was almost a very hard shell, contained carbonaceous matter
	508	9	Probably shaley gray sand (?)
			DRILLED
508	522	14	Sandy shale
	543	21	Sandy shale with thin shells
	544	1	Shell
	563	19	Sandy shale and thin shells
	564	1	Shell
	578	14	Sandy shale and thin shells
	585	7	Sandy shale and shells
	587	2	Shell

The gravity of oil was ..... degrees Baumé. Water in oil amounted to ..... per cent.

NAMES OF DRILLERS

E. E. Arnold, P. R. Bassett,
W. J. Mattaraq

NAMES OF TOOL DRESSERS

C. Bolinbar, J. M. Grindstaff,
Art Vineyard

Date drilling started March 31, 1930

Date well was completed April 23, 1930

Gravity 4

FORMATIONS PENETRATED BY WELL

DEPTH TO Top of Formation	DEPTH TO Bottom of Formation	Thickness	Name of Formation
0	49	49	Surface formation
	March 31, 1930 cemented 18" S.P. casing at 49'		
49	113	64	Surface formation
	213	100	Sand and clay
	387	174	Sand with boulders
	400	13	Sand and sticky clay
	501	101	Sand, clay and boulders
			CORED
501	518	17	Recovered 12'
501	507	6	Rather soft fine grained shaley dark gray sand - some poorly preserved seashells - Turritella and small clam
	513	6	Soft fine grained only slightly shaley light gray sand
	518	5	Probably soft sand (?) Formation all cored the same
518	538	20	Recovered 12'
518	538	20	Soft fine grained slightly shaley dark gray sand - some poorly preserved seashell fragments. Note: Formation all cored the same
538	558	20	Recovered 6'
538	544	6	Soft fine grained slightly shaley dark gray sand - some poorly preserved seashell fragments
	558	14	Probably soft shaley sand (?)
558	578	20	Recovered 19'
558	567	9	Soft fine grained slightly shaley dark gray sand - some poorly preserved seashell fragments
	574	7	Fairly compact fine grained sandy gray blue shale, broken in appearance - no slip planes - lots of carbonaceous material - few seashells
	578	4	Soft fine grained slightly shaley dark gray sand - some poorly preserved seashell fragments
578	598	20	Recovered 15'
578	598	20	Soft fine grained slightly shaley dark gray sand - lots of poorly preserved seashell fragments. Some seemed to be large clam shells (2" to 3") - 2" hard calcareous shell at 582 and 10" at 592'

PETROLEUM SECURITIES COMPANY

WELL NO. Gardner #4 SECTION 26-27-28 FIELD Mt. Poso

DEPTH FROM	TO	FEET	FORMATION
598	618	20	Recovered 12'
598	604	6	Fairly compact fine grained sandy bluish gray shale - some soft streaks of fine shaley gray sand - carbonaceous matter - some seashell fragments
	610	6	Soft fine grained slightly shaley dark gray sand - some poorly preserved seashells - Turritella at 605
	618	8	Probably soft shaley gray sand
618	638	20	Recovered 11'
618	629	11	Soft fine grained dark gray slightly shaley sand - few scattered seashells, poorly preserved (one Acila, one Ledu, clam shells) Bottom 8" had hard streaks of shale
	638	9	Probably soft shaley gray sand (?)
638	658	20	Recovered 6'
638	644	6	Soft fine grained dark gray slightly shaley sand - bottom 11" was a hard calcareous shell. The bottom 8" of the shaley sand had more shale in it and was more compact *
	658	14	Probably soft shaley sand (?). Driller said that formation drilled soft except for the shell
658	678	20	Recovered 8'
658	666	8	Fairly compact not hard fine grained shaley gray sand - top 1' shows some slickensides. Bottom 2" was a hard calcareous shell
	678	12	Probably soft shaley sand (?)
678	683	5	Recovered 6'
678	683	5	Soft fine grained slightly shaley dark gray sand
			DRILLER
683	691	8	Sandy shale
			CORER
691	711	20	Recovered 4'
691	695	.4	Fairly compact not soft fine grained very sandy gray shale - looks like 70° fracture plane at 692, no slickensides
	711	16	Probably very sandy shale (?). The formation drilled the same thruout
711	731	20	Recovered 5'
711	712	1	Soft fine grained shaley gray sand
	717	5	Somewhat broken (in places compact) fine grained very sandy gray shale. Note: Formation consists of a very sandy shale with inclusions of a more compact, hard and not so sandy shale. Breaks irregularly. Looks like fracture at 712'
	731	14	Probably broken sandy shale (?). Driller said formation drilled like broken formation

BC
LABORATORIES Inc.
OIL - CORES - SOIL - WATER
3016 UNION AVENUE
BAKERSFIELD, CALIFORNIA 93305
Phone (805) 323-7473
J. J. EGLIN, Reg. Chem. Engr.

Submitted By: Thomas Oil Company
P. O. Box 5356
Bakersfield, California 93305

Attention Mr. Frank Mondary

Date Reported: 2/25/75
Date Received: 2/17/75
Laboratory No.: 1172

Marked: #62 Run Tribe #6 Sample #7

WATER ANALYSIS - Main Area

Sample Description:

pH or Hydrogen-ion activity		9.1
E.C. x 10^3 @ 25°C (salinity)		1,750 K x 10^6 Micromhos
Electrical Resistivity Ohms M²/M		

Constituents, P. P. M. (parts per million)

Boron, (B)		2.51
Calcium, (Ca)		112
Magnesium, (Mg)		11.4
Sodium, (Na)		230
Potassium, (K)		44
Carbonates, (CO_3)		12.9
Bicarbonates, (HCO_3)		0
Chlorides, (Cl)		216.3
Sulphates, (SO_4)		521
Nitrate, (NO_3)	less than	0.5
Fluoride, (F)		
Total Iron, (Fe)		0.17
Copper, (Cu)	less than	0.01
Manganese, (Mn)	less than	0.01
Chromium, (Cr)		
Zinc, (Zn)		
Aluminum, (Al)		
Silica, (SiO_2)		32.0
Lithium, (Li)		
Lead, (Pb)		
Phenol		
Sulfides as H_2S		
Total Hardness as $CaCO_3$		327.5 (19.1 gr/gal)
Oil (chloroform extractable)		
Total Dissolved Solids		1,156
Total Suspended Solids		
Salinity as NaCl		1,022.0

BC LABORATORIES Inc.

By.....

BC
LABORATORIES Inc.
OIL - CORES - SOIL - WATER
3016 UNION AVENUE
BAKERSFIELD, CALIFORNIA 93305
Phone (805) 325-7475
J. J. EGLIN, Reg. Chem. Engr.

Submitted By: Thomas Oil Company
P. O. Box 5356
Bakersfield, California 93306

Date Reported: 2/25/75
Date Received: 2/17/75
Laboratory No.: 1173

Marked: Attention Mr. Frank Mondary
#63 Run Tribe #6

Sample #8

WATER ANALYSIS Main Area

Sample Description:

pH or Hydrogen-ion activity		9.0
R.C. x 10^5 @ 25°C (salinity)		1,830 K x 10^6 Micromhos
Electrical Resistivity Ohms M'/M		

Constituents, P. P. M. (parts per million)

Boron, (B)		2.49
Calcium, (Ca)		110
Magnesium, (Mg)		15.6
Sodium, (Na)		250
Potassium, (K)		46
Carbonates, (CO_3)		15.3
Bicarbonates, (HCO_3)		0
Chlorides, (Cl)		250.3
Sulphates, (SO_4)		530
Nitrate, (NO_3)	less than	0.5
Fluoride, (F)		
Total Iron, (Fe)		0.08
Copper, (Cu)	less than	0.01
Manganese, (Mn)	less than	0.01
Chromium, (Cr)		
Zinc, (Zn)		
Aluminum, (Al)		
Silica, (SiO_2)		36.0
Lithium, (Li)		
Lead, (Pb)		
Phenol		
Sulfides as H_2S		
Total Hardness as $CaCO_3$		340 (19.8 gr/gal)
Oil (chloroform extractable)		
Total Dissolved Solids		1,224
Total Suspended Solids		
Salinity as NaCl		1,068.7
Hydroxide (OH)		2.7

BC LABORATORIES Inc.

By.....

BC
LABORATORIES Inc.
OIL - CORES - SOIL - WATER
3016 UNION AVENUE
BAKERSFIELD, CALIFORNIA 93305
Phone (805) 325-7473
J. J. EGLIN, Reg. Chem. Engr.

ubmitted By: Thomas Oil Company
P. O. Box 5356
Bakersfield, California 93306

Attention Mr. Frank Nondary

Date Reported: 2/25/75
Date Received: 2/19/75
Laboratory No.: 1209

Marked: Tribe A-6 2/18/75 #1

Olcese Formation Water
analysis from
MAIN AREA

WATER ANALYSIS

Sample Description: Sample #9

pH or Hydrogen-ion activity		8.0
S.C. x 10^6 @ 25°C (salinity)		1,900 X x 10^6 Micromhos
Electrical Resistivity Ohms M'/M		

Constituents, P. P. M. (parts per million)

Boron, (B)		3.52
Calcium, (Ca)		82
Magnesium, (Mg)		37
Sodium, (Na)		260
Potassium, (K)		40
Carbonates, (CO_3)		0
Bicarbonates, (HCO_3)		82.2
Chlorides, (Cl)		26662
Sulphates, (SO_4)		525
Nitrate, (NO_3)	less than	0.5
Fluoride, (F)		
Total Iron, (Fe)		0.64
Copper, (Cu)	less than	0.01
Manganese, (Mn)	less than	0.01
Chromium, (Cr)		
Zinc, (Zn)		
Aluminum, (Al)		
Silica, (SiO_2)		65.0
Lithium, (Li)		
Lead, (Pb)		
Phenol		
Sulfides as H_2S		
Total Hardness as $CaCO_3$		359.2 (20.9 gr/gal)
Oil (chloroform extractable)		
Total Dissolved Solids		1,242
Total Suspended Solids		
Salinity as NaCl		43104.6

BC LABORATORIES Inc.

By.....

B C LABORATORIES INC
CHEMICAL ANALYSIS
PETROLEUM
J. J. EGLIN, REG. CHEM. ENGR.
3016 UNION AVE BAKERSFIELD, CALIFORNIA 93305 PHONE 324-18[illegible]
MAIN OFFICE 4100 PIERCE ROAD, BAKERSFIELD CA 93308 PHONE 327-49[illegible]

Thomas Oil Company
P. O. Box 398
DiGiorgio, California 93217

Date Reported: 6/9/83
Date Received: 6/7/83
Laboratory No.: 5982

WATER ANALYSIS - From Dorsey Area

Sample Description: Dorsey Inj. Wells

Constituents	Parts/million
Boron	1.2
Chloride	254.
Electrical Conductivity, Micromhos	1,590.

B C LABORATORIES, INC.

BY J. J. Eglin
J. J. Eglin

ad

AGRICULTURE
CHEMICAL ANALYSIS
PETROLEUM

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Thomas Oil Company
P. O. Box 398
DiGiorgio, California 93217

Date Reported: 6/9/83
Date Received: 6/7/83
Laboratory No.: 5983

WATER ANALYSIS

Sample Description: Dorsey #2

Constituents	Parts/million
Boron	0.82
Chloride	148.
Electrical Conductivity, Micromhos	1,340.

B C LABORATORIES, INC.

BY J. J. Eglin
J. J. Eglin

ad

BORON, TULARE
CHEMICAL ANALYSIS
PETROLEUM

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DiGiorgio, California 93217

Date Reported: 6/9/83
Date Received: 6/7/83
Laboratory No.: 5984

WATER ANALYSIS

Sample Description: Dorsey #3

Constituents	Parts/million
Boron	0.90
Chloride	98.2
Electrical Conductivity, Micromhos	1,530.

B C LABORATORIES, INC.

BY J. J. Eglin
J. J. Eglin

ad

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CHEMICAL ANALYSIS
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Thomas Oil Company
P. O. Box 398
DiGiorgio, California 93217

Date Reported: 6/9/83
Date Received: 6/7/83
Laboratory No.: 5985

WATER ANALYSIS

Sample Description: Dorsey #4

Constituents	Parts/million
Boron	1.1
Chloride	223.
Electrical Conductivity, Micromhos	1,330.

B C LABORATORIES, INC.

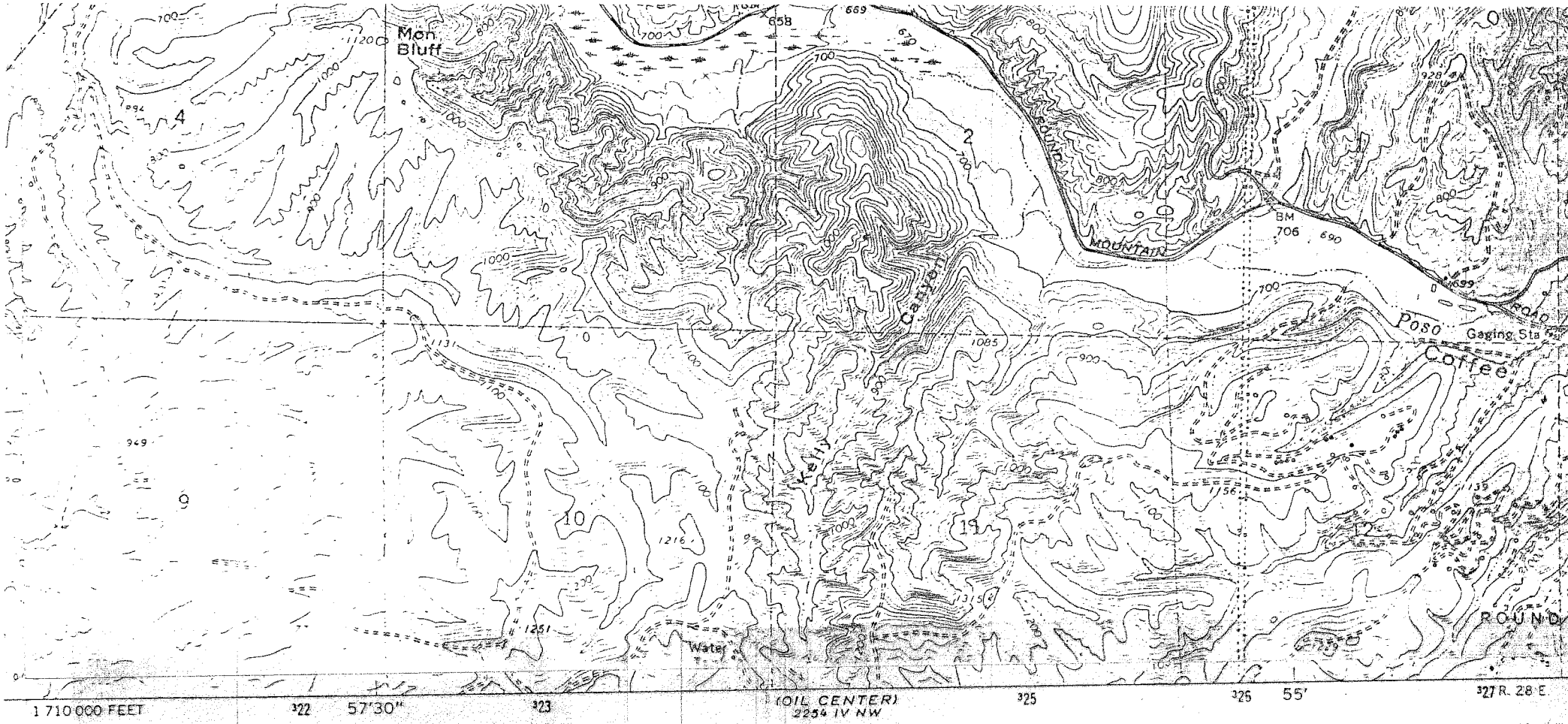
BY J. J. Eglin

ad

New Document

Application for
Olcese Zone exemption
in Mt. Poso Field.
by Thomas Oil Co.

Original sent
to Bob Reid (Sacto. Hdqt)
for comment & to
expedite matter to
proper authorities



SCALE 1:24 000

1 0 1/2 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 .5 1 KILOMETER

CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 10-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

GN MN

1°08' 20 MILS 16' 284 MILS

UTM GRID AND 1965 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

CALIF

QUADRANGLE LOCA

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS

FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092

A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

Map photoin
No major cu

New Document

TO

Al Hbuza
Dist 4

ROOM/STA.NO.

FROM

Bob Reid

RECEIVED

ROOM/STA.NO.

FEB 10 1984

REPRESENTING

CD. Hg

DIVISION OF OIL & GAS
BAKERSFIELD

DATE 2/8/84 | TIME | PHONE

- ☐ Telephoned
- ☐ Returned Call
- ☐ Please Call
- ☐ Will Call Again
- ☐ Was In
- ☐ Wants To See You

- ☐ Information
- ☐ Comment
- ☐ Investigate
- ☐ Contact Me

Note and
- ☐ Re-route
- ☐ Return
- ☐ File

Reply
- ☐ My Signature
- ☐ Copy Me
- ☐ Forwarded Per Request

2/8/84

MESSAGE/REMARKS

Sorry, the copy isn't better, but this is what EPA sent.

Sect. 146.04 (b) 1.

BY

Regards Bob

STD 7 (REV. 10-79)
COMBINATION OF STD 7 AND 118 (ROUTE SLIP) ANNUAL SAVINGS $8,300.

STATE OF CALIFORNIA

MESSAGE

OSP

PART 146—UNDERGROUND INJECTION CONTROL PROGRAM: CRITERIA AND STANDARDS

Subpart A—General Provisions

Authority: Secs. 1421, 1422, 1423, 1431, 1445, 1447, and 1450 of the Safe Drinking Water Act, as amended, 42 U.S.C. 300(f) et. seq.

Subpart A—General Provisions

§ 146.01 Applicability and scope.

(a) This Part sets forth technical criteria and standards for the Underground Injection Control Program. This part should be read in conjunction with 40 CFR Parts 122, 123, and 124 which also apply to UIC programs. 40 CFR Part 122 defines the regulatory framework of EPA administered permit programs. 40 CFR Part 123 describes the elements of an approvable State program and procedures for EPA approval of State participation in the permit programs. 40 CFR Part 124 describes the procedures the Agency will use for issuing permits under the covered programs. Certain of these procedures will also apply to State-administered programs as specified in 40 CFR Part 123.

(b) Upon the approval, partial approval or promulgation of a State UIC program by the Administrator, any underground injection which is not authorized by the Director by rule or by permit is unlawful.

§ 146.02 Law authorizing these regulations.

The laws authorizing these regulations and all other UIC program regulations are referenced in 40 CFR part 122. They include Sections 1421, 1422, 1423, 1431, 1445, 1447 and 1450 of the Public Health Service Act as amended by the Safe Drinking Water Act ("SDWA") (Pub. L. 93–523) and by the SDWA Amendments of 1977 (Pub. L. 95–190).

§ 146.03 Definitions.

The following definitions apply to the underground injection control program.

Abandoned well means a well whose use has been permanently discontinued or which is in a state of disrepair such that it cannot be used for its intended purpose or for observation purposes.

Administrator means the Administrator of the United States Environmental Protection Agency, or an authorized representative.

Application means the EPA standard national forms for applying for a permit, including any additions, revisions or modifications to the forms; or forms approved by EPA for use in approved States, including any approved modifications or revisions. For RCRA, application also includes the information required by the Director under § 122.25 (contents of Part B of the RCRA application).

Aquifer means a geological formation, group of formations, or part of a formation that is capable of yielding a significant amount of water to a well or spring.

Area of review means the area surrounding an injection well described according to the criteria set forth in § 146.06 or in the case of an area permit the project area plus a circumscribing area the width of which is either ¼ of a mile or a number calculated according to the criteria set forth in § 146.06.

Casing means a pipe or tubing of appropriate material, of varying diameter and weight, lowered into a borehole during or after drilling in order to support the sides of the hole and thus prevent the walls from caving, to prevent loss of drilling mud into porous ground, or to prevent water, gas, or other fluid from entering or leaving the hole.

Catastrophic collapse means the sudden and utter failure of overlying "strata" caused by removal of underlying materials.

Cementing means the operation whereby a cement slurry is pumped in a drilled hole and/or forced behind the casing.

Confining bed means a body of impermeable or distinctly less permeable material stratigraphically adjacent to one or more aquifers.

Confining zone means a geological formation, group of formations, or part of a formation that is capable of limiting fluid movement above an injection zone.

Contaminant means any physical, chemical, biological, or radiological substance or matter in water.

Conventional mine means an open or underground excavation for the production of minerals.

Director means the Regional Administrator or the State Director, as the context requires, or an authorized representative. When there is no approved State program, and there is an EPA administered program, "Director" means the Regional Administrator. When there is an approved State program, "Director" normally means the State Director. In some circumstances however, EPA retains the authority to take certain actions even where there is an approved State program. (For example, when EPA issued an NPDES permit prior to the approval of a State program, EPA may retain jurisdiction over that permit after program approval; see § 123.69.) In such cases, the term "Director" means the Regional Administrator and not the State Director.

Disposal well means a well used for the disposal of waste into a subsurface stratum.

Effective date of a UIC program means the date that a State UIC program is approved or established by the Administrator.

Environmental Protection Agency ("EPA") means the United States Environmental Protection Agency.

EPA means the United States "Environmental Protection Agency."

Exempted aquifer means an aquifer or its portion that meets the criteria in the definition of "underground source of drinking water" but which has been exempted according to the procedures of § 122.35(b).

Existing injection well means an "injection well" other than a "new injection well."

Experimental technology means a technology which has not been proven feasible under the conditions in which it is being tested.

Facility or activity means any "HWM facility," UIC "injection well," NPDES "point source," or State 404 dredge and fill activity, or any other facility or activity (including land or appurtenances thereto) that is subject to regulation under the RCRA, UIC, NPDES, or 404 programs.

Fault means a surface or zone of rock fracture along which there has been displacement.

Flow rate means the volume per time unit given to the flow of gases or other fluid substance which emerges from an orifice, pump, turbine or passes along a conduit or channel.

Fluid means material or substance which flows or moves whether in a semisolid, liquid, sludge, gas, or any other form or state.

Formation means a body of rock characterized by a degree of lithologic homogeneity which is prevailingly, but not necessarily, tabular and is mappable on the earth's surface or traceable in the subsurface.

Formation fluid means "fluid" present in a "formation" under natural conditions as opposed to introduced fluids, such as drilling mud.

Generator means any person, by site location, whose act or process produces hazardous waste identified or listed in 40 CFR Part 261.

Ground water means water below the land surface in a zone of saturation.

Hazardous waste means a hazardous waste as defined in 40 CFR 261.3.

Hazardous Waste Management facility ("HWM facility") means all contiguous land, and structures, other appurtenances, and improvements on the land used for treating, storing, or disposing of hazardous waste. A facility may consist of several treatment, storage, or disposal operational units (for example, one or more landfills, surface impoundments, or combination of them).

HWM facility means "Hazardous Waste Management facility."

Injection well means a "well" into which "fluids" are being injected.

Injection zone means a geological "formation", group of formations, or part of a formation receiving fluids through a well.

Lithology means the description of rocks on the basis of their physical and chemical characteristics.

Owner or operator means the owner or operator of any facility or activity subject to regulation under the RCRA, UIC, NPDES, or 404 programs.

Packer means a device lowered into a well to produce a fluid-tight seal.

Permit means an authorization, license, or equivalent control document issued by EPA or an "approved State" to implement the requirements of this part and Parts 122, 123 and 124. Permit does not include RCRA interim status (§ 122.23), UIC authorization by rule (§ 122.37), or any permit which has not yet been the subject of final agency action, such as a "draft permit" or a "proposed permit."

Plugging means the act or process of stopping the flow of water, oil or gas into or out of a formation through a borehole or well penetrating that formation.

Plugging record means a systematic listing of permanent or temporary abandonment of water, oil, gas, test, exploration and waste injection wells, and may contain a well log, description of amounts and types of plugging material used, the method employed for plugging, a description of formations which are sealed and a graphic log of the well showing formation location, formation thickness, and location of plugging structures.

Pressure means the total load or force per unit area acting on a surface.

Project means a group of wells in a single operation.

Radioactive Waste means any waste which contains radioactive material in concentrations which exceed those listed in 10 CFR Part 20, Appendix B, Table II column 2.

RCRA means the Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act of 1976 (Pub. L. 94-580, as amended by Pub. L. 95-609, 42 U.S.C. 6901 et seq.).

SDWA means the Safe Drinking Water Act (Pub. L. 95-523, as amended by Pub. L. 95-190, 42 U.S.C. 300(f) *et seq.).*

Site means the land or water area where any facility or activity is physically located or conducted, including adjacent land used in connection with the facility or activity.

Sole or principal source aquifer means an aquifer which has been designated by the Administrator pursuant to sections 1424 (a) or (e) of the SDWA.

State Director means the chief administrative officer of any State or interstate agency operating an approved program, or the delegated representative of the State Director. If responsibility is divided among two or more State or interstate agencies, "State Director" means the chief administrative officer of the State or interstate agency authorized to perform the particular procedure or function to which reference is made.

Stratum (plural *strata*) means a single sedimentary bed or layer, regardless of thickness, that consists of generally the same kind of rock material.

Subsidence means the lowering of the natural land surface in response to: Earth movements; lowering of fluid pressure; removal of underlying supporting material by mining or solution of solids, either artificially or from natural causes; compaction due to wetting (Hydrocompaction); oxidation of organic matter in soils; or added load on the land surface.

Surface casing means the first string of well casing to be installed in the well.

Total dissolved solids ("TDS") means the total dissolved (filterable) solids as determined by use of the method specified in 40 CFR Part 136.

UIC means the Underground Injection Control program under Part C of the Safe Drinking Water Act, including an "approved program."

Underground injection means a "well injection."

Underground source of drinking water (USDW) means an aquifer or its portion

(1)(i) Which supplies any public water system; or

(ii) Which contains a sufficient quantity of ground water to supply a public water system; and

(A) Currently supplies drinking water for human consumption; or

(B) Contains fewer than 10,000 mg total dissolved solids; and

(2) Which is not an exempted aquifer

USDW means "underground source of drinking water."

Well means a bored, drilled or driven shaft, or a dug hole, whose depth is greater than the largest surface dimension.

Well injection means the subsurface emplacement of fluids through a bored, drilled or driven well; or through a dug well, where the depth of the dug well is greater than the largest surface dimension.

Well plug means a watertight and gastight seal installed in a borehole or well to prevent movement of fluids.

Well stimulation means several processes used to clean the well bore, enlarge channels, and increase pore space in the interval to be injected thus making it possible for wastewater to move more readily into the formation, and includes (1) surging, (2) jetting, (3) blasting, (4) acidizing, (5) hydraulic fracturing.

Well monitoring means the measurement, by on-site instruments or laboratory methods, of the quality of water in a well.

§ 146.04 Criteria for exempted aquifers.

An aquifer or a portion thereof which meets the criteria for an "underground source of drinking water" in § 146.03 may be determined under 40 CFR 122.35 be an "exempted aquifer" if it meets e following criteria:

(a) It does not currently serve as a source of drinking water; and

(b) It cannot now and will not in the future serve as a source of drinking water because:

(1) It is mineral, hydrocarbon or geothermal energy producing, or can be demonstrated by a permit applicant as part of a permit application for a Class II or III operation to contain minerals or hydrocarbons that considering their quantity and location are expected to be commercially producible.

(2) It is situated at a depth or location which makes recovery of water for drinking water purposes economically or technologically impractical;

(3) It is so contaminated that it would be economically ot technologically impractical to render that water fit for human consumption; or

(4) It is located over a Class III well mining area subject to subsidence or catastrophic collapse; or

c) The Total Dissolved Solids content of the ground water is more than 3,000 and less than 10,000 mg/l and it is not reasonably expected to supply a public water system.

§ 146.05 Classification of injection wells.

Injection wells are classified as follows:

(a) *Class I.*

(1) Wells used by generators of hazardous waste or owners or operators of hazardous waste management facilities to inject hazardous waste beneath the lowermost formation containing, within one quarter (¼) mile of the well bore, an underground source of drinking water.

(2) Other industrial and municipal disposal wells which inject fluids beneath the lowermost formation containing, within one quarter mile of the well bore, an underground source of drinking water.

(b) *Class II.* Wells which inject fluids:

(1) Which are brought to the surface in connection with conventional oil or natural gas production and may be commingled with waste waters from gas plants which are an integral part of production operations, unless those waters are classified as a hazardous waste at the time of injection.

(2) For enhanced recovery ot oil or natural gas; and

(3) For storage of hydrocarbons which are liquid at standard temperature and pressure.

(c) Class III. Wells which inject for extraction of minerals including:

(1) Mining of sulfur by the Frasch process;

(2) In situ production of uranium or other metals. This category includes only in-situ production from ore bodies which have not been conventionally mined; Solution mining of conventional mines such as stopes leaching is included in Class V.

(3) Solution mining of salts or potash.

(d) Class IV

(1) Wells used by generators of hazardous waste or of radioactive waste, by owners or operators of hazardous waste management facilities, or by owners or operators of radioactive waste disposal sites to dispose of hazardous waste or radioactive waste into a formation which within one quarter (¼) mile of the well contains an underground source of drinking water.

(2) Wells used by generators of hazardous waste or of radioactive waste, by owners or operators of hazardous waste management facilities,or by owners or operators of radioactive waste disposal sites to dispose of hazardous waste or radioactive waste above a formation which within one quarter (¼) mile of the well contains an underground source of drinking water.

(3) Wells used by generators of hazardous waste or owners or operators of hazardous waste management facilities to dispose of hazardous waste, which cannot be classified under §§ 146.05(a)(1) or 146.05(d) (1) and (2) (e.g., wells used to dispose of hazardous wastes into or above a formation which contains an aquifer which has been exempted pursuant to § 146.04).

(e) Class V—Injection wells not included in Class I, II, III, or IV. Class V wells include:

(1) Air conditioning return flow wells used to return to the supply aquifer the water used for heating or cooling in a heat pump;

(2) Cesspools including multiple dwelling, community or regional cesspools, or other devices that receive wastes which have an open bottom and sometimes have perforated sides. The UIC requirements do not apply to single family residential cesspools nor to non-residential cesspools which receive solely sanitary wastes and have the capacity to serve fewer than 20 persons a day.

(3) Cooling water return flow wells use inject water previously used for cooling;

(4) Drainage wells used to drain surfac fluid, primarily storm runoff, into a subsurface formation;

(5) Dry wells used for the injection of wastes into a subsurface formation;

(6) Recharge wells used to replenish th water in an aquifer;

(7) Salt water intrusion barrier wells u to inject water into a fresh water aquifer prevent the intrusion of salt water into th fresh water;

(8) Sand backfill and other backfill wells used to inject a mixture of wate and sand, mill tailings or other solids into mined out-portions of subsurface mines whether what is injected is a radioactive waste or not.

(9) Septic system wells used to inje the waste or effluent from a multiple dwelling, business establishment, community or regional business establishment septic tank. The UIC requirements do not apply to single family residential septic system wells nor to non-residential septic system wells which are used solely for the disposal of sanitary waste and have t capacity to serve fewer than 20 perso a day.

(10) Subsidence control wells (not used the purpose of oil or natural gas productio used to inject fluids into a non-oil or gas producing zone to reduce or eliminate subsidence associated with the overdraft fresh water;

(11) Radioactive waste disposal wel other than Class IV;

(12) Injection wells associated wi the recovery of geothermal energy f heating, aquaculture and productior electric power.

(13) Wells used for solution mining conventional mines such as stopes leaching;

(14) Wells used to inject spent brine into the same formation from which it was withdrawn after extraction of halogens or their salts;

(15) Injection wells used in experimental technologies.

(16) Injection wells used for in situ recovery of lignite, coal, tar sands, ar oil shale.

§ 146.06 Area of Review.

The area of review for each injection well or each field, project or area of the State shall be determined according to either paragraph (a) or (b) of this section. The Director may solicit input from the owners or operators of injection wells within the State as to which method is most appropriate for each geographic area or field.

(a) *Zone of endangering influence.* (1) The zone of endangering influence shall be:

(i) In the case of application(s) for well permit(s) under § 122.38 that area the radius of which is the lateral distance in which the pressures in the injection zone may cause the migration of the injection and/or formation fluid into an underground source of drinking water; or

(ii) In the case of an application for an area permit under § 122.39, the project area plus a circumscribing area the width of which is the lateral distance from the perimeter of the project area, in which the pressures in the injection zone may cause the migration of the injection and/or formation fluid into an underground source of drinking water.

(2) Computation of the zone of endangering influence may be based upon the parameters listed below and should be calculated for an injection time period equal to the expected life of the injection well or pattern. The following modified Theis equation illustrates one form which the mathematical model may take.

$$r = \left(\frac{2.25KHt}{S10^{x}}\right)^{1/2}$$

where

$$x = \frac{4\pi KH(h_w - h_w S_b G_b)}{2.3Q}$$

r = Radius of endangering influence from injection well (length)
k = Hydraulic conductivity of the injection zone (length/time)
H = Thickness of the injection zone (length)
t = Time of injection (time)
S = Storage coefficient (dimensionless)
Q = Injection rate (volume/time)
h_{w_o} = Observed original hydrostatic head of injection zone (length) measured from the base of the lowermost underground source of drinking water
h_w = Hydrostatic head of underground source of drinking water (length) measured from the base of the lowest underground source of drinking water
S_bG_b = Specific gravity of fluid in the injection zone (dimensionless)
π = 3.142 (dimensionless)

The above equation is based on the following assumptions:

(i) The injection zone is homogenous and isotropic;

(ii) The injection zone has infinite areal extent;

(iii) The injection well penetrates the entire thickness of the injection zone;

(iv) The well diameter is infinitesimal compared to "r" when injection time is longer than a few minutes; and

(v) The emplacement of fluid into the injection zone creates instantaneous increase in pressure.

Other models may be used as appropriate for different situations encountered in the field or where the model assumptions match more closely those situations.

(b) *Fixed Radius.* (1) In the case of application(s) for well permit(s) under § 122.38 a fixed radius around the well of not less than one-fourth (¼) mile may be used.

(2) In the case of an application for an area permit under § 122.39 a fixed width of not less than one-fourth (¼) mile for the circumscribing area may be used.

In determining the fixed radius, the following factors shall be taken into consideration: Chemistry of injected and formation fluids; hydrogeology; population and ground-water use and dependence; and historical practices in the area.

(c) If the area of review is determined by a mathematical model pursuant to paragraph (a) of this section, the permissible radius is the result of such calculation even if it is less than one-fourth (¼) mile.

§ 146.07 Corrective Action.

In determining the adequacy of corrective action proposed by the applicant under 40 CFR 122.44 and in determining the additional steps needed to prevent fluid movement into underground sources of drinking water, the following criteria and factors shall be considered by the Director:

(a) Nature and volume of injected fluid;

(b) Nature of native fluids or by-products of injection;

(c) Potentially affected population;

(d) Geology;

(e) Hydrology;

(f) History of the injection operation;

(g) Completion and plugging records;

(h) Abandonment procedures in effect at the time the well was abandoned; and

(i) Hydraulic connections with underground sources of drinking water.

§ 146.08 Mechanical Integrity

(a) An injection well has mechani integrity if:

(1) There is no significant leak in t casing, tubing or packer; and

(2) There is no significant fluid movement into an underground sour of drinking water through vertical channels adjacent to the injection w bore.

(b) One of the following methods mu be used to evaluate the absence of significant leaks under paragraph (a)(1 of this section:

(1) Monitoring of annulus pressure;

(2) Pressure test with liquid or gas;

(3) Records of monitoring showing t absence of significant changes in the relationship between injection pressu and injection flow rate for the followi Class II enhanced recovery wells:

(i) Existing wells completed without packer provided that a pressure test h been performed and the data is available and provided further that on pressure test shall be performed at a time when the well is shut down and if the running of such a test will not caus further loss of significant amounts of oi or gas; or

(ii) Existing wells constructed withou a long string casing, but with surface casing which terminates at the bas fresh water provided that local geological and hydrological features allow such construction and provided further that the annular space shall be visually inspected. For these wells, the Director shall prescribe a monitoring program which will verify the absence of significant fluid movement from the injection zone into an USDW.

(c) One of the following methods mus be used to determine the absence of significant fluid movement under paragraph (a)(2) of this section:

(1) The results of a temperature or noise log; or

(2) For Class II only, cementing records demonstrating the presence of adequate cement to prevent such migration; or

(3) For Class III wells where the nature of the casing precludes the use of the logging techniques prescribed at paragraph (c)(1) of this section, cementing records demonstrating the presence of adequate cement to prevent such migration;

(4) For Class III wells where the Director elects to rely on cementing records to demonstrate the absence of significant fluid movement, the monitoring program prescribed by § 146.33(b) shall be designed to verify the absence of significant fluid movement.

(d) The Director may allow the use of a test to demonstrate mechanical integrity other than those listed in paragraphs (b) and (c)(2) of this section with the written approval of the Administrator. To obtain approval, the Director shall submit a written request to the Administrator, which shall set forth the proposed test and all technical data supporting its use. The Administrator shall approve the request if it will reliably demonstrate the mechanical integrity of wells for which its use is proposed. Any alternate method approved by the Administrator shall be published in the Federal Register and may be used in all States unless its use is restricted at the time of approval by the Administrator.

(e) In conducting and evaluating the tests enumerated in this section or others to be allowed by the Director, the owner or operator and the Director shall apply methods and standards generally accepted in the industry. When the owner or operator reports the results of mechanical integrity tests to the Director, he shall include a description of the test(s) and the method(s) used. In making his/her evaluation, the Director shall review monitoring and other test data submitted since the previous evaluation.

§ 146.09 Criteria for Establishing Permitting Priorities.

In determining priorities for setting times for owners or operators to submit applications for authorization to inject under the procedures of § 122.38 or § 123.4(g), the Director shall base these priorities upon consideration of the following factors:

(a) Injection wells known or suspected to be contaminating underground sources of drinking water;

(b) Injection wells known to be injecting fluids containing hazardous contaminants;

(c) Likelihood of contamination of underground sources of drinking water;

(d) Potentially affected population;

(e) Injection wells violating existing State requirements;

(f) Coordination with the issuance of permits required by other State or Federal permit programs;

(g) Age and depth of the injection well; and

(h) Expiration dates of existing State permits, if any.

§ 146.10 Plugging and abandoning Class I—III wells.

(a) Prior to abandoning Class I—III wells the well shall be plugged with cement in a manner which will not allow the movement of fluids either into or between underground sources of drinking water. The Director may allow Class III wells to use other plugging materials if he is satisfied that such materials will prevent movement of fluids into or between underground sources of drinking water.

(b) Placement of the cement plugs shall be accomplished by one of the following:

(1) The Balance Method;

(2) The Dump Bailer Method;

(3) The Two-Plug Method; or

(4) An alternative method approved by the Director, which will reliably provide a comparable level of protection to underground sources of drinking water.

(c) The well to be abandoned shall be in a state of static equilibrium with the mud weight equalized top to bottom, either by circulating the mud in the well at least once or by a comparable method prescribed by the Director, prior to the placement of the cement plug(s).

(d) The plugging and abandonment plan required in 40 CFR § 122.42(f) and § 122.41(e) shall, in the case of a Class III project which underlies or is in an aquifer which has been exempted under 40 CFR 146.04, also demonstrate adequate protection of USDWs. The Director shall prescribe aquifer cleanup and monitoring where he deems it necessary and feasible to insure adequate protection of USDWs.

Subpart B—Criteria and Standards Applicable to Class I Wells

§ 146.11 Applicability.

This subpart establishes criteria and standards for underground injection control programs to regulate Class I wells.

§ 146.12 Construction Requirements.

(a) All Class I wells shall be sited in such a fashion that they inject into a formation which is beneath the lowermost formation containing, within one quarter mile of the well bore, an underground source of drinking water.

(b) All Class I wells shall be cased and cemented to prevent the movement of fluids into or between underground sources of drinking water. The casing and cement used in the construction of each newly drilled well shall be designed for the life expectancy of the well. In determining and specifying casing and cementing requirements, the following factors shall be considered:

(1) Depth to the injection zone;

(2) Injection pressure, external pressure, internal pressure, and axial loading;

(3) Hole size;

(4) Size and grade of all casing strings (wall thickness, diameter, nominal weight, length, joint specification, and construction material);

(5) Corrosiveness of injected fluid, formation fluids, and temperatures;

(6) Lithology of injection and confining intervals; and

(7) Type or grade of cement.

(c) All Class I injection wells, except those municipal wells injecting non-corrosive wastes, shall inject fluids through tubing with a packer set immediately above the injection zone, or tubing with an approved fluid seal as an alternative. The tubing, packer, and fluid seal shall be designed for the expected service.

(1) The use of other alternatives to a packer may be allowed with the written approval of the Director. To obtain approval, the operator shall submit a written request to the Director, which shall set forth the proposed alternative and all technical data supporting its use. The Director shall approve the request if the alternative method will reliably provide a comparable level of protection to underground sources of drinking water. The Director may approve an alternative method solely for an individual well or for general use.

(2) In determining and specifying requirements for tubing, packer, or alternatives the following factors shall be considered:

(i) Depth of setting;

(ii) Characteristics of injection fluid (chemical content, corrosiveness, and density);

(iii) Injection pressure;

(iv) Annular pressure;

(v) Rate, temperature and volume of injected fluid; and

(vi) Size of casing.

(d) Appropriate logs and other tests shall be conducted during the drilling and construction of new Class I wells. A descriptive report interpreting the results of such logs and tests shall be prepared by a knowledgeable log analyst and submitted to the Director. At a minimum, such logs and tests shall include:

(1) Deviation checks on all holes constructed by first drilling a pilot hole, and then enlarging the pilot hole by reaming or another method. Such checks shall be at sufficiently frequent intervals to assure that vertical avenues for fluid migration in the form of diverging holes are not created during drilling.

(2) Such other logs and tests as may be needed after taking into account the availability of similar data in the area of the drilling site, the construction plan, and the need for additional information that may arise from time to time as the construction of the well progresses. In determining which logs and tests shall be required, the following logs shall be considered for use in the following situations:

(i) For surface casing intended to protect underground sources of drinking water:

(A) Resistivity, spontaneous potential, and caliper logs before the casing is installed; and

(B) A cement bond, temperature, or density log after the casing is set and cemented.

(ii) For intermediate and long strings of casing intended to facilitate injection:

(A) Resistivity, spontaneous potential, porosity, and gamma ray logs before the casing is installed;

(B) Fracture finder logs; and

(C) A cement bond, temperature, or density log after the casing is set and cemented.

(e) At a minimum, the following information concerning the injection formation shall be determined or calculated for new Class I wells:

(1) Fluid pressure;

(2) Temperature;

(3) Fracture pressure;

(4) Other physical and chemical characteristics of the injection matrix; and

(5) Physical and chemical characteristics of the formation fluids.

§ 146.13 Operating, Monitoring and Reporting Requirements.

(a) *Operating Requirements.* Operating requirements shall, at a minimum, specify that:

(1) Except during stimulation inje pressure at the wellhead shall not exceed a maximum which shall be calculated so as to assure that the pressure in the injection zone during injection does not initiate new fracti or propagate existing fractures in th injection zone. In no case shall injec pressure initiate fractures in the confining zone or cause the moveme of injection or formation fluids into a underground source of drinking wate

(2) Injection between the outermo casing protecting underground sourc of drinking water and the well bore prohibited.

(3) Unless an alternative to a pack has been approved under § 146.12(c) annulus between the tubing and the string of casings shall be filled with fluid approved by the Director and a pressure, also approved by the Dire shall be maintained on the annulus.

(b) *Monitoring Requirements.* Monitoring requirements shall, at a minimum, include:

(1) The analysis of the injected flu with sufficient frequency to yield representative data of their characteristics;

(2) Installation and use of co...uc recording devices to monitor injectio pressure, flow rate and volume, and pressure on the annulus between the tubing and the long string of casing;

(3) A demonstration of mechanical integrity pursuant to § 146.08 at least once every five years during the life the well; and

(4) The type, number and location wells within the area of review to be used to monitor any migration of fluic into and pressure in the underground sources of drinking water, the parameters to be measured and the frequency of monitoring.

(c) *Reporting Requirements.* Report requirements shall, at a minimum, include:

(1) Quarterly reports to the Director on:

(i) The physical, chemical and other relevant characteristics of injection fluids;

(ii) Monthly average, maximum and minimum values for injection pressure flow rate and volume, and annular pressure; and

(iii) The results of monitoring prescribed under subparagraph (b)(4) this section.

(2) Reporting the results, with ...fir quarterly report after the completion, o

(i) Periodic tests of mechanical integrity;

(ii) Any other test of the injection we conducted by the permittee if required by the Director; and

(iii) Any well work over.

§ 146.14 Information to be Considered by the Director.

This section sets forth the information which must be considered by the Director in authorizing Class I wells. For existing or converted new Class I well the Director may rely on the existing permit file for those items of information listed below which are current and accurate in the file. For a newly drilled Class I well, the Director shall require the submission of all the information listed below. For both existing and new Class I wells certain maps, cross-sections, tabulations of wells within the area of review and other data may be included in the application by reference provided they are current, readily available to the Director (for example, in the permitting agency's files) and sufficiently identified to be retrieved. In cases where EPA issues the permit all the information in this Section must be submitted to the Administrator.

(a) Prior to the issuance of a permit for an existing Class I well to operate or the construction or conversion of a new Class I well the Director shall consider the following:

(1) Information required in 40 CFR 122.4 and 122.38(c);

(2) A map showing the injection well(s) for which a permit is sought and the applicable area of review. Within he area of review, the map must show the number, or name, and location of all producing wells, injection wells, abandoned wells, dry holes, surface bodies of water, springs, mines (surface and subsurface), quarries, water wells and other pertinent surface features including residences and roads. The map should also show faults, if known or suspected. Only information of public record is required to be included on this map;

(3) A tabulation of data on all wells within the area of review which penetrate into the proposed injection zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of plugging and/or completion, and any additional information the Director may require;

(4) Maps and cross sections indicating the general vertical and lateral limits of all underground sources of drinking water within the area of review, their position relative to the injection formation and the direction of water movement, where known, in each underground source of drinking water which may be affected by the proposed injection;

(5) Maps and cross sections detailing the geologic structure of the local area;

(6) Generalized maps and cross sections illustrating the regional geologic setting;

(7) Proposed operating data:

(i) Average and maximum daily rate and volume of the fluid to be injected;

(ii) Average and maximum injection pressure; and

(iii) Source and an analysis of the chemical, physical, radiological and biological characteristics of injection fluids;

(8) Proposed formation testing program to obtain an analysis of the chemical, physical and radiological characteristics of and other information on the receiving formation;

(9) Proposed stimulation program;

(10) Proposed injection procedure;

(11) Schematic or other appropriate drawings of the surface and subsurface construction details of the well.

(12) Contingency plans to cope with all shut-ins or well failures so as to prevent migration of fluids into any underground source of drinking water;

(13) Plans (including maps) for meeting the monitoring requirements in § 146.13(b);

(14) For wells within the area of review which penetrate the injection zone but are not properly completed or plugged, the corrective action proposed to be taken under 40 CFR 122.44;

(15) Construction procedures including a cementing and casing program, logging procedures, deviation checks, and a drilling, testing, and coring program; and

(16) A certificate that the applicant has assured, through a performance bond or other appropriate means, the resources necessary to close, plug or abandon the well as required by 40 CFR 122.42(g).

(b) Prior to granting approval for the operation of a Class I well the Director shall consider the following information:

(1) All available logging and testing program data on the well;

(2) A demonstration of mechanical integrity pursuant to § 146.08;

(3) The anticipated maximum pressure and flow rate at which the permittee will operate;

(4) The results of the formation testing program;

(5) The actual injection procedure;

(6) The compatibility of injected waste with fluids in the injection zone and minerals in both the injection zone and the confining zone; and

(7) The status of corrective action on defective wells in the area of review.

(c) Prior to granting approval for th plugging and abandonment of a Class well the Director shall consider the following information:

(1) The type and number of plugs t used;

(2) The placement of each plug including the elevation of the top and bottom;

(3) The type and grade and quantit cement to be used;

(4) The method for placement of th plugs; and

(5) The procedure to be used to me the requirements of § 146.10(c).

§ 146.15 Mid-course evaluation requirements.

In compliance with 40 CFR 122.18(c)(4)(c)(ii) the data to be submitted on each Class I permit at month intervals during the first two years of operation of the State progr shall at a minimum include the following:

(a) The data required in § 146.14(a

(b) The data required in § 146.14(including, under location, the distan and direction from the injection wel

(c) The depth to the top and botto any USDW;

(d) The distance to the nearest do gradient water supply well;

(e) A description of the geology a hydrology of the area;

(f) The construction characteristi the well;

(g) The corrective action propose well as that performed;

(h) The type and results of all mechanical integrity tests reported the Director; and

(i) Any reporting to the Director § 122.41(d).

Subpart C—Criteria and Standards Applicable to Class II Wells

§ 146.21 Applicability.

This subpart establishes criteria and standards for underground injection control programs to regulate Class II wells.

§ 146.22 Construction requirements.

(a) All new Class II wells shall be sited in such a fashion that they inject into a formation which is separated from any USDW by a confining zone that is free of known open faults or fractures within the area of review.

(b)(1) All Class II injection wells shall be cased and cemented to prevent movement of fluids into or between underground sources of drinking water. The casing and cement used in the construction of each newly drilled well shall be designed for the life expectancy of the well. In determining and specifying casing and cementing requirements, the following factors shall be considered:

(i) Depth to the injection zone;
(ii) Depth to the bottom of all USDWs; and
(iii) Estimated maximum and average injection pressures;

(2) In addition the Director may consider information on:

(i) Nature of formation fluids;
(ii) Lithology of injection and confining zones;
(iii) External pressure, internal pressure, and axial loading;
(iv) Hole size;
(v) Size and grade of all casing strings; and
(vi) Class of cement.

(c) The requirements in paragraph (b) of this section need not apply to existing or newly converted Class II wells located in existing fields if:

(1) Regulatory controls for casing and cementing existed for those wells at the time of drilling and those wells are in compliance with those controls; and
(2) Well injection will not result in the movement of fluids into an underground source of drinking water so as to create a significant risk to the health of persons.

(d) The requirements in paragraph (b) of this section need not apply to newly drilled wells in existing fields if:

(1) They meet the requirements of the State for casing and cementing applicable to that field at the time of submission of the State program to the Administrator; and
(2) Well injection will not result in the movement of fluids into an underground source of drinking water so as to create a significant risk to the health of persons.

(e) Where a State did not have regulatory controls for casing and cementing prior to the time of the submission of the State program to the Administrator, the Director need not apply the casing and cementing requirements in paragraph (b) of this section if he submits as a part of his application for primacy, an appropriate plan for casing and cementing of existing, newly converted, and newly drilled wells in existing fields, and the Administrator approves the plan.

(f) Appropriate logs and other tests shall be conducted during the drilling and construction of new Class II wells. A descriptive report interpreting the results of that portion of those logs and tests which specifically relate to (1) an USDW and the confining zone adjacent to it, and (2) the injection and adjacent formations shall be prepared by a knowledgeable log analyst and submitted to the Director. At a minimum, these logs and tests shall include:

(1) Deviation checks on all holes constructed by first drilling a pilot hole and then enlarging the pilot hole, by reaming or another method. Such checks shall be at sufficiently frequent intervals to assure that vertical avenues for fluid movement in the form of diverging holes are not created during drilling.

(2) Such other logs and tests as may be needed after taking into account the availability of similar data in the area of the drilling site, the construction plan, and the need for additional information that may arise from time to time as the construction of the well progresses. In determining which logs and tests shall be required the following shall be considered by the Director in setting logging and testing requirements:

(i) For surface casing intended to protect underground sources of drinking water in areas where the lithology has not been determined:

(A) Electric and caliper logs before casing is installed; and

(B) A cement bond, temperature, or density log after the casing is set and cemented.

(ii) For intermediate and long strings of casing intended to facilitate injection:

(A) Electric, porosity and gamma ray logs before the casing is installed;

(B) Fracture finder logs; and

(C) A cement bond, temperature, or density log after the casing is set and cemented.

(g) At a minimum, the following information concerning the injection formation shall be determined or calculated for new Class II wells or projects:

(1) Fluid pressure;
(2) Estimated fracture pressure;
(3) Physical and chemical characteristics of the injection zone.

§ 146.23 Operating, monitoring, and reporting requirements.

(a) *Operating Requirements.* Operating requirements shall, at a minimum, specify that:

(1) Injection pressure at the wellhead shall not exceed a maximum [illegible] be calculated so as to assure that pressure during injection does not initiate new fractures or propagate existing fractures in the confining zone adjacent to the USDWs. In no case shall injection pressure cause the movement of injection or formation fluids into an underground source of drinking water;

(2) Injection between the outermost casing protecting underground sources of drinking water and the well bore is prohibited.

(b) *Monitoring Requirements.* Monitoring requirements shall, at a minimum, include:

(1) Monitoring of the nature of injected fluids at time intervals sufficiently frequent to yield data representative of their characteristics;

(2) Observation of injection pressure, flow rate, and cumulative volume at least with the following frequency:

(i) Weekly for produced fluid disposal operations;

(ii) Monthly for enhanced recovery operations;

(iii) Daily during the injection of hydrocarbons and injection for withdrawal of stored hydrocarbons;

(iv) Daily during the injection phase of cyclic steam operations;

And recording of one observation of injection pressure, flow rate and cumulative volume at reasonable intervals no greater than 30 days.

(3) A demonstration of mechanical integrity pursuant to § 146.08 at least once every five years during the life of the injection well;

(4) Maintenance of the results of monitoring until the next permit review (see 40 CFR 122.42(e)); and

(5) Hydrocarbon storage and enhanced recovery may be monitored on a field or project basis rather than an individual well basis by manifold monitoring. Manifold monitoring may be used in cases of facilities consisting of more than one injection well, operated with a common manifold. Separate monitoring systems for each well are not required provided the owner/operator demonstrates that manifold monitoring is comparable to individual well monitoring.

(c) *Reporting Requirements.*

(1) Reporting requirements shall at a minimum include an annual report to the Director summarizing the results of monitoring required under paragraph (b) of this section. Such summaries shall include monthly records of injection pressures, fluids, and any major changes in characteristics or sources of injected fluid. Previously submitted information may be included by reference.

(2) Owners or operators of hydrocarbon storage and enhanced recovery projects may report on a field or project basis rather than an individual well basis where manifold monitoring is used.

§ 146.24 Information to be considered by the director.

This section sets forth the information which must be considered by the Director in authorizing Class II wells. Certain maps, cross-sections, tabulations of wells within the area of review, and other data may be included in the application by reference provided they are current, readily available to the Director (for example, in the permitting agency's files) and sufficiently identified to be retrieved. In cases where EPA issues the permit, all the information in this Section is to be submitted to the Administrator.

(a) Prior to the issuance of a permit for an existing Class II well to operate or the construction or conversion of a new Class II well the Director shall consider the following:

(1) Information required in 40 CFR 122.4 and 122.38(c);

(2) A map showing the injection well or project area for which a permit is sought and the applicable area of review. Within the area of review, the map must show the number or name and location of all existing producing wells, injection wells, abandoned wells, dry holes, and water wells. The map may also show surface bodies of waters, mines (surface and subsurface), quarries and other pertinent surface features including residences and roads, and faults if known or suspended. Only information of public record and pertinent information known to the applicant is required to be included on this map. This requirement does not apply to existing Class II wells; and

(3) A tabulation of data reasonably available from public records or otherwise known to the applicant on all wells within the area of review included on the map required under paragraph (a)(2) of this section which penetrate the proposed injection zone or, in the case of Class II wells operating over the fracture pressure of the injection formation, all known wells within the area of review which penetrate formations affected by the increase in pressure. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of plugging and completion, and any additional information the Director may require. In cases where the information would be repetitive and the wells are of similar age, type, and construction the Director may elect to only require data on a representative number of wells. This requirement does not apply to existing Class II wells.

(4) Proposed operating data:

(i) Average and maximum daily rate and volume of fluids to be injected;

(ii) Average and maximum injection pressure; and

(iii) Source and an appropriate analysis of the chemical and physical characteristics of the injection fluid.

(5) Appropriate geological data on the injection zone and confining zone including lithologic description, geological name, thickness and depth;

(6) Geologic name and depth to bottom of all underground sources of drinking water which may be affected by the injection;

(7) Schematic or other appropriate drawings of the surface and subsurface construction details of the well;

(8) In the case of new injection wells the corrective action proposed to be taken by the applicant under 40 CFR 122.44;

(9) A certificate that the applicant has assured through a performance bond or other appropriate means, the resources necessary to close, plug or abandon the well as required by 40 CFR 122.42(g);

(b) In addition the Director may consider the following:

(1) Proposed formation testing program to obtain the information required by § 146.22(g);

(2) Proposed stimulation program;

(3) Proposed injection procedure;

(4) Proposed contingency plans, if any, to cope with well failures so as to prevent migration of contaminating fluids into an underground source of drinking water;

(5) Plans for meeting the monitoring requirements of § 146.23(b).

(c) Prior to granting approval for the operation of a Class II well the Director shall consider the following information:

(1) All available logging and testing program data on the well;

(2) A demonstration of mechanical integrity pursuant to § 146.08;

(3) The anticipated maximum pressure and flow rate at which the permittee will operate.

(4) The results of the formation testing program;

(5) The actual injection procedure; and

(6) For new wells the status of corrective action on defective wells in the area of review.

(d) Prior to granting approval for the plugging and abandonment of a Class II well the Director shall consider the following information:

(1) The type, and number of plugs to be used;

(2) The placement of each plug including the elevation of top and bottom;

(3) The type, grade, and quant cement to be used;

(4) The method of placement plugs; and

(5) The procedure to be used the requirements of § 146.10(c).

§ 146.25 Mid-course evaluation requirements.

(a) In compliance with 40 CFR 122.18(c)(4)(C)(ii) the data to be submitted on each new Class II at six months intervals during th two years of operation of the St program shall at a minimum incl following:

(1) The data required in § 146.

(2) The data required in § 146. including, under location, the di and direction from the injection

(3) The depth to the top and b any USDW;

(4) The distance to the neares gradient water supply well;

(5) A description of the geolog hydrology of the area;

(6) The construction characte the well;

(7) The corrective action prop well as that performed; and

(8) Any reporting to the Direc § 122.41(d).

(b) The Director shall also sul type and results of all Mechanic Integrity tests reported on existi and new (conversion only) well the first two years of operation.

(c) The Director shall require temperature log or noise log, on sample of Class II wells in case operators submitted cementing to meet the requirement of § 14 The wells to be tested shall be by a formal random selection p The sampling shall be done on pool basis and be statistically representative of the wells in th or pool. At a minimum, the sam for each State shall be 100 well percent of the number of Class injection wells in the State whic smaller. At least half of the wel must be existing wells.

Subpart D—Criteria and Standards Applicable to Class III Wells

§ 146.31 Applicability.

This subpart establishes criteria and standards for underground injection control programs to regulate Class III wells.

§ 146.32. Construction requirements.

(a) All new Class III wells shall be cased and cemented to prevent the migration of fluids into or between underground sources of drinking water. The Director may waive the cementing requirement for new wells in existing projects or portions of existing projects where he has substantial evidence that no contamination of underground sources of drinking water would result. The casing and cement used in the construction of each newly drilled well shall be designed for the life expectancy of the well. In determining and specifying casing and cementing requirements, the following factors shall be considered:

(1) Depth to the injection zone;
(2) Injection pressure, external pressure, internal pressure, axial loading, etc.;
(3) Hole size;
(4) Size and grade of all casing strings (wall thickness, diameter, nominal weight, length, joint specification, and construction material);
(5) Corrosiveness of injected fluids and formation fluids;
(6) Lithology of injection and confining zones; and
(7) Type and grade of cement.

(b) Appropriate logs and other tests shall be conducted during the drilling and construction of new Class III wells. A descriptive report interpreting the results of such logs and tests shall be prepared by a knowledgeable log analyst and submitted to the Director. The logs and tests appropriate to each type of Class III well shall be determined based on the intended function, depth, construction and other characteristics of the well, availability of similar data in the area of the drilling site and the need for additional information that may arise from time to time as the construction of the well progresses. Deviation checks shall be conducted on all holes where pilot holes and reaming are used, unless the hole will be cased and cemented by circulating cement to the surface. Where deviation checks are necessary they shall be conducted at sufficiently frequent intervals to assure that vertical avenues for fluid migration in the form of diverging holes are not created during drilling.

(c) Where the injection zone is a formation which is naturally water-bearing the following information concerning the injection zone shall be determined or calculated for new Class III wells or projects:
(1) Fluid pressure;
(2) Fracture pressure; and
(3) Physical and chemical charateristics of the formation fluids.

(d) Where the injection formation is not a water-bearing formation, the information in paragraph (c)(2) of this section must be submitted.

(e) Where injection is into a formation which contains water with less than 10,000 mg/l TDS monitoring wells shall be completed into the injection zone and into any underground sources of drinking water above the injection zone which could be affected by the mining operation. These wells shall be located in such a fashion as to detect any excursion of injection fluids, process by-products, or formation fluids outside the mining area or zone. If the operation may be affected by subsidence or catastrophic collapse the monitoring wells shall be located so that they will not be physically affected.

(f) Where injection is into a formation which does not contain water with less than 10,000 mg/l TDS, no monitoring wells are necessary in the injection stratum.

(g) Where the injection wells penetrate an USDW in an area subject to subsidence or catastrophic collapse an adequate number of monitoring wells shall be completed into the USDW to detect any movement of injected fluids, process by-products or formation fluids into the USDW. The monitoring wells shall be located outside the physical influence of the subsidence or catastrophic collapse.

(h) In determining the number, location, construction and frequency of monitoring of the monitoring wells the following criteria shall be considered:
(1) The population relying on the USDW affected or potentially affected by the injection operation;
(2) The proximity of the injection operation to points of withdrawal of drinking water;
(3) The local geology and hydrology;
(4) The operating pressures and whether a negative pressure gradient is being maintained;
(5) The nature and volume of the injected fluid, the formation water, and the process by-products; and
(6) The injection well density.

§ 146.33 Operating, monitoring, and reporting requirements.

(a) *Operating Requirements.* Operating requirements prescribed shall, at a minimum, specify tha
(1) Except during well stimulation injection pressure at the wellhead sh be calculated so as to assure that the pressure in the injection zone during injection does not initiate new fractu or propagate existing fractures in the injection zone. In no case, shall inject pressure initiate fractures in the confining zone or cause the migration injection or formation fluids into an underground source of drinking wate
(2) Injection between the outermos casing protecting underground sourc of drinking water and the well bore s be prohibited.

(b) *Monitoring Requirements.* Monitoring requirements shall, at a minimum, specify:
(1) Monitoring of the nature of injected fluids with sufficient frequen to yield representative data on its characteristics. Whenever the injectio fluid is modified to the extent that the analysis required by § 146.34(a)(7)(iii) incorrect or incomplete, a new analysi as required by § 146.34(a)(7)(iii) shall provided to the Director.
(2) Monitoring of injection pressure and either flow rate or volume semi-monthly, or metering and daily recording of injected and produc volumes as appropriate.
(3) Demonstration of mechanical integrity pursuant to § 146.08 at least once every five years during the life of the well for salt solution mining.
(4) Monitoring of the fluid level in th injection zone semi-monthly, where appropriate and monitoring of the parameters chosen to measure water quality in the monitoring wells require by § 146.32(e), semi-monthly.
(5) Quarterly monitoring of wells required by 146.32(g).
(6) All Class III wells may be monitored on a field or project basis rather than an individual well basis b manifold monitoring. Manifold monitoring may be used in cases of facilities consisting of more than one injection well, operating with a comm manifold. Separate monitoring system for each well are not required provide the owner/operator demonstrates that manifold monitoring is comparable to individual well monitoring.

(c) *Reporting Requirements.* Reporti requirements shall, at a minimum, include:
(1) Quarterly reporting to the Directo on required monitoring;
(2) Results of mechanical integri an any other periodic test required by the Director reported with the first regular quarterly report after the completion of the test; and
(3) Monitoring may be reported on a project or field basis rather than individual well basis where manifold monitoring is used.

§ 146.34 Information to be considered by the Director.

This section sets forth the information which must be considered by the Director in authorizing Class III wells. Certain maps, cross sections, tabulations of wells within the area of review, and other data may be included in the application by reference provided they are current, readily available to the Director (for example, in the permitting agency's files) and sufficiently identified to be retrieved. In cases where EPA issues the permit, all the information in this section must be submitted to the Administrator.

(a) Prior to the issuance of a permit for an existing Class III well or area to operate or the construction of a new Class III well the Director shall consider the following:

(1) Information required in 40 CFR 122.4 and 122.38(c);

(2) A map showing the injection well or project area for which a permit is sought and the applicable area of review. Within the area of review, the map must show the number or name and location of all existing producing wells, injection wells, abandoned wells, dry holes, public water systems and water wells. The map may also show surface bodies of waters, mines (surface and subsurface) quarries and other pertinent surface features including residences and roads, and faults if known or suspected. Only information of public record and pertinent information known to the applicant is required to be included on this map.

(3) A tabulation of data reasonably available from public records or otherwise known to the applicant on wells within the area of review included on the map required under paragraph (a)(2) of this section which penetrate the proposed injection zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of plugging and completion, and any additional information the Director may require. In cases where the information would be repetitive and the wells are of similar age, type, and construction the Director may elect to only require data on a representative number of wells.

(4) Maps and cross sections indicating the vertical limits of all underground sources of drinking water within the area of review, their position relative to the injection formation, and the direction of water movement, where known, in every underground source of drinking water which may be affected by the proposed injection;

(5) Maps and cross sections detailing the geologic structure of the local area;

(6) Generalized map and cross sections illustrating the regional geologic setting;

(7) Proposed operating data:

(i) Average and maximum daily rate and volume of fluid to be injected;

(ii) Average and maximum injection pressure; and

(iii) Qualitative analysis and ranges in concentrations of all constituents of injected fluids. The applicant may request Federal confidentiality as specified in 40 CFR Part 2. If the information is proprietary an applicant may, in lieu of the ranges in concentrations, choose to submit maximum concentrations which shall not be exceeded. In such a case the applicant shall retain records of the undisclosed concentrations and provide them upon request to the Director as part of any enforcement investigation.

(8) Proposed formation testing program to obtain the information required by § 146.32(c).

(9) Proposed stimulation program;

(10) Proposed injection procedure;

(11) Schematic or other appropriate drawings of the surface and subsurface construction details of the well;

(12) Plans (including maps) for meeting the monitoring requirements of § 146.33(b);

(13) Expected changes in pressure, native fluid displacement, direction of movement of injection fluid;

(14) Contingency plans to cope with all shut-ins or well failures so as to prevent the migration of contaminating fluids into underground sources of drinking water;

(15) A certificate that the applicant has assured, through a performance bond, or other appropriate means, the resources necessary to close, plug, or abandon the well as required by 40 CFR 122.42(g) and

(16) The corrective action proposed to be taken under 40 CFR 122.44.

(b) Prior to granting approval for the operation of a Class III well the Director shall consider the following information:

(1) All available logging and testing data on the well;

(2) A satisfactory demonstration of mechanical integrity for all new wells and for all existing salt solution wells pursuant to § 146.08;

(3) The anticipated maximum pressure and flow rate at which the permittee will operate;

(4) The results of the formation testi program;

(5) The actual injection procedures; and

(6) The status of corrective action on defective wells in the area of review.

(c) Prior to granting approval for the plugging and abandonment of a Class I well the Director shall consider the following information:

(1) The type and number of plugs to b used;

(2) The placement of each plug including the elevation of the top and bottom;

(3) The type, grade and quantity of cement to be used;

(4) The method of placement of the plugs, and

(5) The procedure to be used to meet the requirements of § 146.10(c).

§ 146.35 Mid-course evaluation requirements.

In compliance with 40 CFR 122.18(c)(4)(C)(ii) the data to be submitted on each Class III permit at six month intervals during the first two years of operation of the State program shall at a minimum include the following:

(a) The data required in § 146.14(a)(i);

(b) The data required in § 146.34(a)(3) including, under location, the distance and direction from the injection well;

(c) The depth to the top and bottom of any USDW;

(d) The distance to the nearest down-gradient water supply well;

(e) A description of the geology and hydrology of the area;

(f) The construction characteristics of the well;

(g) The type and results of all mechanical integrity tests reported to the Director during the first two years of the program; and

(h) Any reporting to the Director under § 122.41(d).

Subpart E—Criteria and Standards Applicable to Class IV Injection Wells [Reserved]

Subpart F—Criteria and Standards Applicable to Class V Injection Wells

§ 146.51 Applicability.

This subpart sets forth Criteria and Standards for underground injection control programs to regulate all injection not regulated in Subparts B, C, D, and E.

(a) Generally, wells covered by this Subpart inject non-hazardous fluids into or above formations that contain underground sources of drinking water. It includes all wells listed in § 146.05(e) but is not limited to those types of injection wells.

(b) It also includes wells not covered in Class IV that inject radioactive material listed in 10 CFR Part 20, Appendix B, Table II, Column 2.

§ 146.52 Inventory and Assessment.

(a) The owner or operator of any Class V well shall, within one year of the effective date of an underground injection control program, notify the Director of the existence of any well meeting the definitions of Class V under his control, and submit the inventory information required in 40 CFR 122.37(c)(1).

(b) Within three (3) years of approval of the State program the Director shall complete and submit to EPA a report containing:

(1) The information on the construction features of Class V wells, and the nature and volume of the injected fluids;

(2) An assessment of the contamination potential of the Class V wells using hydrogeological data available to the State;

(3) An assessment of the available corrective alternatives where appropriate and their environmental and economic consequences; and

(4) Recommendations both for the most appropriate regulatory approaches and for remedial actions where appropriate.